

King Fahd University of Petroleum & Minerals
College of Environmental Design
Construction Engineering & Management Department
CEM 510
Construction Planning & Scheduling
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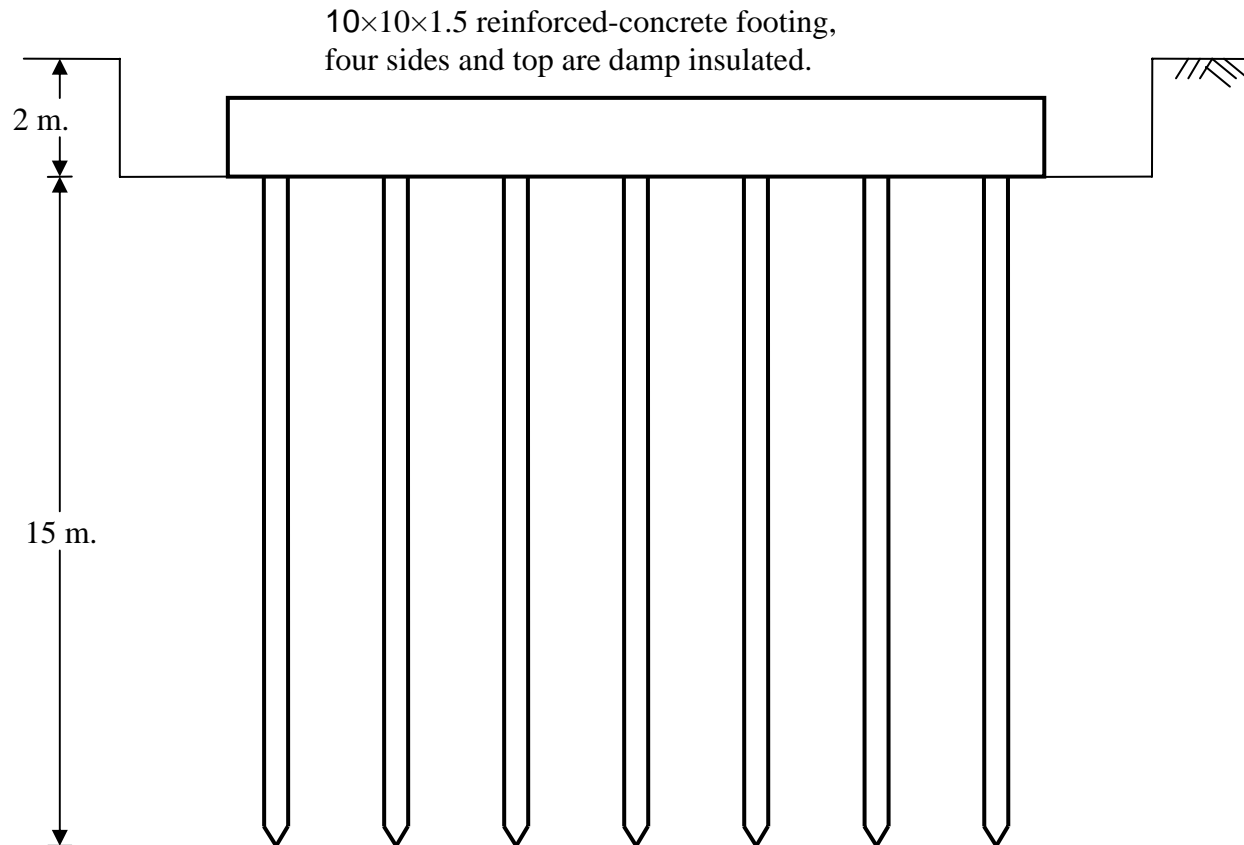


Project Planning



Pile-supported RC footing

- Scope of work:



Determination of Activities

1. Excavate
2. Procure & deliver piles
3. Procure & deliver steel bars
4. Fabricate forms
5. Drive piles
6. Trim piles
7. Erect forms
8. Fix steel bars



Pile-supported RC footing

9. Pour concrete

10. Strip forms

11. Apply insulation



Decisions

- An excavator is already there on site.
- Pre-cast concrete piles will be used.
- Reinforcing-steel bars will be delivered as in plans.
- Wooden forms are already on site.
- Pile driving rig is there on site.
- There is no need to use a crane to erect forms.
- Ready-mix concrete will be delivered and poured in place.
- There is no need to cure concrete.

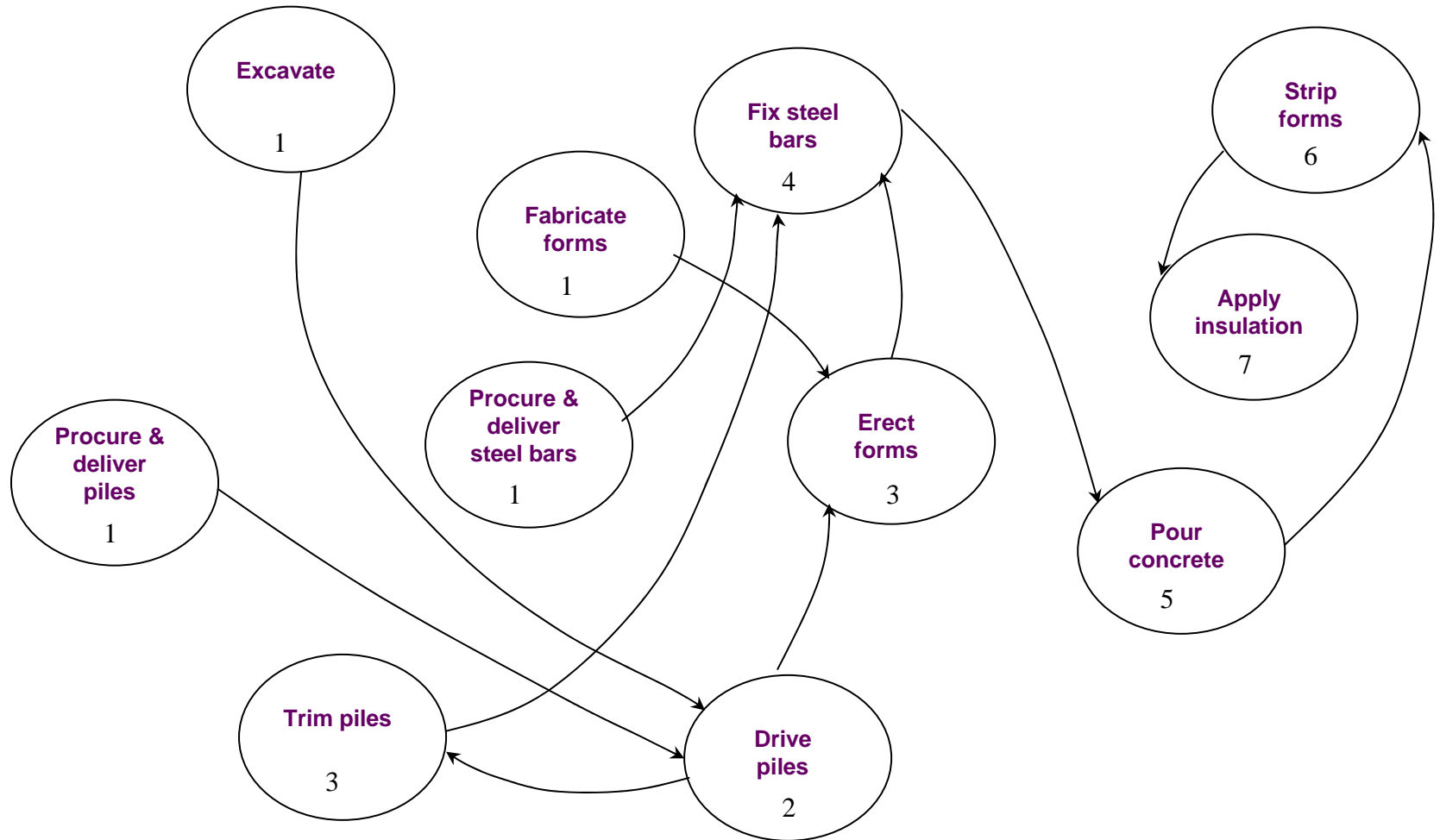


Ascertainment of relationships

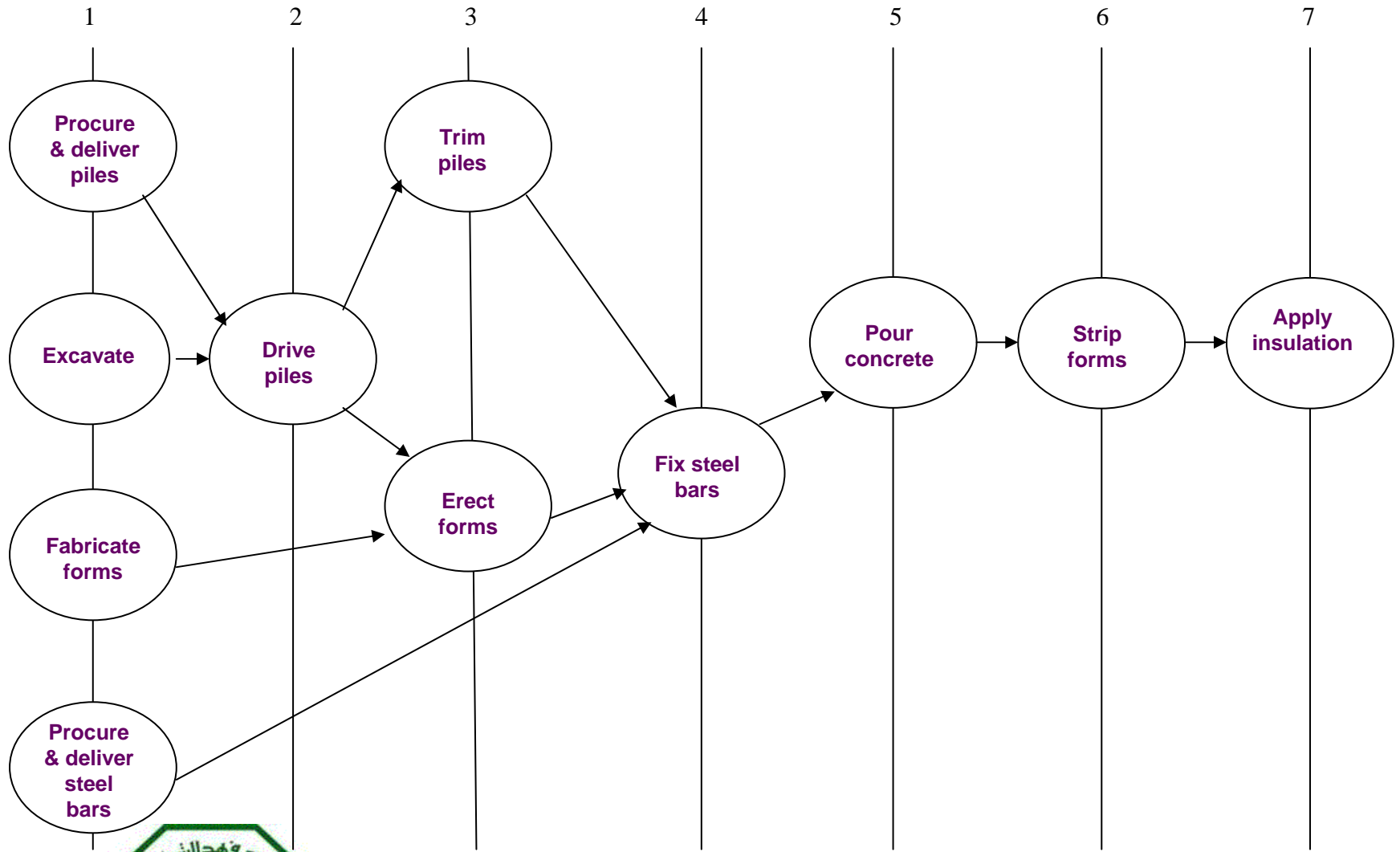
Activity No.	Activity name	Depends on
1	Excavate	--
2	Procure & deliver piles	--
3	Procure & deliver steel bars	--
4	Fabricate forms	--
5	Drive piles	1,2
6	Trim piles	5
7	Erect forms	4,5
8	Fix steel bars	3,6,7
9	Pour concrete	8
10	Strip forms	9
11	Apply insulation	10



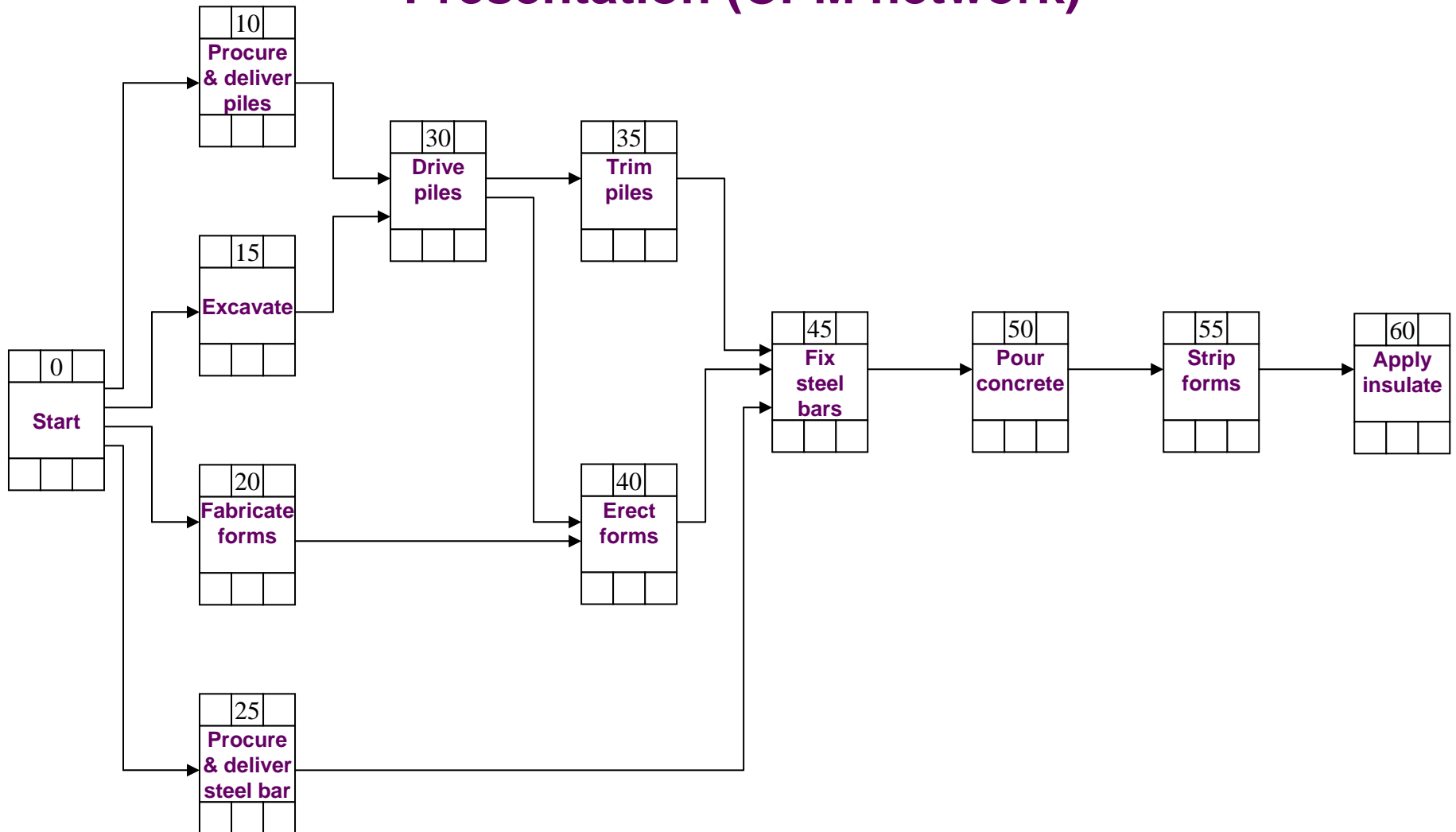
Ascertainment of relationships



Presentation



Presentation (CPM network)



Project Planning

- The only consideration is to establish a complete and accurate picture of activities and inter-relationships.
- The time durations of the individual activities are not of concern during the planning stage.
- It is assumed that the labor and equipment needs of the activities can be met as they arise.



Project Planning using CPM

- CPM is a planning technique that stands for Critical Path Method.
- CPM is a graphical project model called a network.
- Project planning is the devising of a workable scheme of activities to accomplish the project .
- Project planning requires an intimate knowledge of construction methods with the ability to visualize discrete work packages (activities).



Values of CPM network

- **Preparing the network has forced the contractor to think the project through from start to finish.**
- **Decisions have been made about equipment, construction methods, and sequence of operations.**
- **The network diagram is an expedient medium for communication.**
- **If the project manager must be changed during construction, the network can assist appreciably in effecting a smooth transition.**



Steps of project planning

- **Determination of activities to complete the project.**
- **Ascertainment of the sequential relationships among activities (job logic).**
- **Presentation of the activities and the relationships in the form of a network.**



Determination of activities

- The segments into which a project is subdivided for planning purpose.
- An activity is a single work step that has a recognizable beginning and end and requires time for its accomplishment.
- The activities used may represent relatively large segments or may be limited to small steps of a project.
- The network detail is also a function of the level of project management involved.



Guidelines to determine activities

- **By area of responsibility; works done by the main contractor and each subcontractor should be separated.**
- **By category of work as distinguished by crew, equipment, or material requirements.**
- **By distinct structural elements such as footings, walls, beams, columns, or slabs.**
- **With regard to owner's breakdown of the work for bidding or payment purposes.**
- **With regard to the contractor's breakdown for estimating and cost-accounting purposes.**



relationships among activities (job logic)

- Refers to the determined order in which the activities are to be accomplished in the field.
- The start of some activities obviously depends on the completion of others.
- Many activities are independent of one another and can proceed concurrently.
- Much of job logic follows from well-established work sequence that are usual and standard in the trade.



Restraints

- A project plan must reflect the practical restraints or limitations that apply to most project activities.
- **Physical restraints:** Placing forms and reinforcing steel might be thought of as restraints to pouring concrete.
- **Material restraints:** The start of placing of reinforcing steel is restrained by the necessary preliminary action of shop-drawing approval, steel fabrication, and delivery.
- **Safety restraints:** The sequencing of structural operations on multistory buildings.



Presentation of activities and relationships

There are two symbolic conventions used to draw networks:

- **Precedence notation:** Depicts each activity as a rectangular box.
- **Arrow notation:** Shows each activity as an arrow.

Precedence diagrams have several important advantages over arrow diagrams.

In precedence network, each time-consuming activity is portrayed by a rectangular figure. The dependencies between activities are indicated by dependency lines going from one activity to another.



The precedence diagram

- Precedence diagrams start with a single opening activity and conclude with a single closing activity.
- Each path through the network must be continuous with no gaps.
- The numbering of activities is not standard practice but can be used for the purpose of easy identification.
- The general synthesis of a network is from start to finish, from project beginning on the left to project completion on the right.



The precedence diagram

- The length of the lines between activities has no significance.
- Arrowheads are not always shown on the dependency lines because of the obvious left to right flow of time.
- Dependency lines that go backward from one activity to another should not be used.
- Crossover occur when one dependency line must cross over another to satisfy job logic.

